

Transportation and the Economy



Transportation continues to play a key role in a growing U.S. economy. It contributes a sizable proportion to the Gross Domestic Product (GDP), consumes a large amount of the economy's goods and services, and employs millions of people. Transportation is also an important revenue source and expenditure item for federal, state, and local governments.

Using the most recent data, this chapter focuses on some of the major aspects of transportation's relationship to the U.S. economy. First, it discusses measures of transportation's role in the U.S. economy. Then, the chapter examines how much Americans spend on transportation, using Consumer Expenditure Survey data, and reviews employment and productivity in the transportation sector. Finally, it discusses government transportation-related revenues and expenditures.

TRANSPORTATION AND GROSS DOMESTIC PRODUCT

There are several ways to measure transportation's role in the economy. The broadest measure, which consists of purchases of all transportation-related goods (e.g., cars and gasoline) and services (e.g., trucking and automobile insurance) is called transportation-related final demand (TRFD). Using this broad measure, transportation-related purchases, including exports, accounted for \$905 billion or 11.2 percent of GDP in 1997. When this figure is adjusted for inflation and expressed in chained

1992 dollars, TRFD totaled \$811.6 billion. As shown in tables 3-1 and 3-2, TRFD grew by about one-tenth of a percentage point every year since 1993.

When compared with other components of final demand, transportation ranked fourth. As in previous years, housing was the largest component, followed by health care and food (see table 3-3).

A narrower measure of transportation's importance in the economy is the value-added by transportation services, both for-hire and in-house. This measure includes only those services that move people and goods on the transportation system.

In 1997, the for-hire transportation industry, together with warehousing, contributed \$255.5 billion to the U.S. economy (see table 3-4). The trucking and warehousing industry group contributed \$97.9 billion to U.S. GDP. Although information regarding the for-hire trucking industry alone is not available, operating revenue data from the U.S. Census Bureau's annual Motor Freight Transportation and Warehousing Survey can be used to estimate the for-hire trucking industry's contribution to GDP. Using these data, it is estimated that for-hire trucking operations accounted for 94 percent of the trucking and warehousing group totals in the 1990s. Applying this indicator to 1997, the for-hire trucking industry alone contributed about \$92 billion to U.S. GDP, almost \$18 billion more than air transportation's contribution.

Although the government has collected data on most for-hire transportation services on a regular basis for many years, this has not been the case for in-house transportation services (e.g., grocery companies that use their own truck fleets to move goods from their warehouses to their retail outlets). To fill this gap, the Bureau of

Transportation Statistics (BTS) in conjunction with the Bureau of Economic Analysis (BEA) in the U.S. Department of Commerce developed an accounting tool called the U.S. Transportation Satellite Accounts (TSAs) to measure the contribution of in-house transportation to the economy. The results of this joint effort are available in the recently released BTS report, *Transportation Satellite Accounts: A New Way of Measuring Transportation Services in America*.

The TSAs show in-house transportation totaled \$121 billion in 1992 (the latest year for which data are available). Together, in-house and for-hire transportation services contributed about \$313 billion, or 5 percent of the value-added in GDP in 1992. This is roughly comparable to the value-added by the wholesale/retail trade industry.

To provide data on in-house and for-hire transportation in a unified system and on a more comprehensive and timely basis, BTS and BEA are implementing a joint program that will extend the TSAs to more recent years.

Consumer Expenditures on Transportation¹

American households spent, on average, about \$6,400 for transportation in 1996, an increase of 6.7 percent from the previous year's average of \$6,000. This increase was due to rising household income and may also reflect delayed expenditures due to the recession in the early 1990s. The average income of American households increased from \$37,000 in 1995 to \$38,000 in 1996, a 2.9 percent increase.

Table 3-5 shows changes in household spending on transportation over the 1994 to 1996 period. As shown, vehicle purchases are the largest component of household transportation expenditures.

¹ Data in this section are from USDOL BLS 1996a.

Table 3-1

Transportation-Related Components of U.S. GDP: 1993–98

(Current \$ billions)

	1993	1994	1995	1996	1997	1998
Personal consumption of transportation						
Motor vehicles and parts	226.2	246.6	255.4	264.8	269.5	289.4
Gasoline and oil	107.6	109.4	115.6	124.5	126.5	112.6
Transportation services	170.2	186.2	203.1	222.3	240.3	252.5
Total	504.0	542.2	574.1	611.6	636.3	654.5
Gross private domestic investment						
Transportation structures	4.1	4.3	4.4	5.4	6.1	U
Transportation equipment	99.9	118.6	126.2	137.2	152.0	U
Total	104.0	122.9	130.6	142.6	158.1	U
Exports(+)						
Civilian aircraft, engines, and parts	32.7	31.5	26.1	30.8	41.4	54.6
Automotive vehicles, engines, and parts	52.5	57.8	61.8	65.0	74.0	72.6
Passenger fares	16.6	17.1	18.9	20.4	20.9	20.8
Other transportation	23.1	24.9	26.8	27.0	27.9	27.5
Total	124.9	131.3	133.6	143.2	164.2	175.5
Imports(-)						
Civilian aircraft, engines, and parts	11.3	11.3	10.7	12.7	16.6	21.7
Automotive vehicles, engines, and parts	102.4	118.3	123.8	128.9	140.8	150.3
Passenger fares	11.3	12.9	14.7	15.8	18.2	18.2
Other transportation	25.7	27.3	27.4	27.7	29.3	30.0
Total	150.7	169.8	176.6	185.1	204.9	220.2
Net exports of transportation-related goods and services	-25.8	-38.5	-43.0	-41.9	-40.7	-44.7
Government transportation-related purchases						
Federal purchases	17.6	18.8	18.1	18.9	19.7	U
State and local purchases	99.8	106.5	110.0	115.5	123.1	U
Defense-related purchases	9.5	8.2	8.5	8.9	8.2	8.2
Total	126.9	133.5	136.6	143.2	151.0	U
Transportation-related final demand¹	709.1	760.3	798.3	855.5	905.0	U
Gross Domestic Product (GDP)	6,558.1	6,947.0	7,269.6	7,661.6	8,110.9	8,508.9
Total transportation in GDP (percent)	10.8	10.9	11.0	11.2	11.2	U

¹Demand for goods and services produced in the United States, regardless of where they are consumed. The measure counts exported goods and services, but does not include imports.

KEY: GDP = Gross Domestic Product; U = data are unavailable.

SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, various issues, 1998, National Income and Product Accounts tables.

Table 3-2

Transportation-Related Components of U.S. GDP: 1993–98

(Chained 1992 \$ billions)

	1993	1994	1995	1996	1997	1998
Personal consumption of transportation						
Motor vehicles and parts	218.9	230.	230.6	235.0	239.3	258.7
Gasoline and oil	108.7	109.8	114.3	116.0	117.9	119.8
Transportation services	163.1	175.2	186.4	200.5	212.2	220.3
Total	490.7	515.0	531.3	551.5	569.4	598.8
Gross private domestic investment						
Transportation structures	3.9	3.9	3.9	4.6	4.9	U
Transportation equipment	98.3	113.2	119.4	127.6	140.3	U
Total	102.2	117.1	123.3	132.2	145.2	U
Exports(+)						
Civilian aircraft, engines, and parts	31.7	29.7	23.8	27.0	35.0	45.7
Automotive vehicles, engines, and parts	52.1	56.7	59.9	62.4	70.4	68.9
Passenger fares	16.4	16.4	17.2	18.6	19.7	19.8
Other transportation	22.7	24.6	26.0	25.5	26.3	26.8
Total	122.9	127.4	126.9	133.5	151.4	161.2
Imports(-)						
Civilian aircraft, engines, and parts	10.9	10.6	9.8	11.2	14.1	18.1
Automotive vehicles, engines, and parts	100.9	112.9	114.8	118.8	129.4	137.9
Passenger fares	11.5	13.0	14.1	15.0	16.3	16.1
Other transportation	25.6	27.2	26.5	26.1	28.1	29.4
Total	148.9	163.7	165.2	171.1	187.9	201.5
Net exports of transportation-related goods and services	-26.0	-36.3	-38.3	-37.6	-36.5	-40.3
Government transportation-related purchases						
Federal purchases	16.9	17.9	16.2	16.5	16.8	U
State and local purchases	97.5	101.5	101.5	104.2	108.8	U
Defense-related purchases	9.5	8.0	8.2	8.7	7.9	7.6
Total	123.9	127.4	125.9	129.4	133.5	U
Transportation-related final demand¹	690.8	723.2	742.2	775.5	811.6	U
Gross Domestic Product (GDP)	6,389.6	6,610.7	6,761.7	6,994.8	7,269.8	7,549.9
Total transportation in GDP (percent)	10.8	10.9	11.0	11.1	11.2	U

¹Demand for goods and services produced in the United States, regardless of where they are consumed. The measure counts exported goods and services, but does not include imports.

KEY: GDP = Gross Domestic Product; U = data are unavailable.

SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, various issues, 1998, National Income and Product Accounts tables.

Table 3-3

Major Societal Functions in GDP

(Current \$ billions)

Societal function	1992	1997
GDP	6,244	8,111
Housing	1,469	1,969
Health	880	1,151
Food	803	956
Transportation	669	905
Education	428	559
Other	1,995	2,572
Percent		
GDP	100.0	100.0
Housing	23.5	24.3
Health	14.1	14.2
Food	12.9	11.8
Transportation	10.7	11.2
Education	6.9	6.9
Other	32.0	31.7

KEY: GDP = Gross Domestic Product.

NOTE: Percentages may not add due to rounding.

SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, various issues, 1998, National Income and Product Accounts tables.

► Regional Differences

Historically, households in the West, on average, spent more on transportation than those in the Midwest, South, and Northeast. In the past decade, however, household transportation expenditures in the Midwest and South increased faster than in the West and Northeast. In 1995, midwestern households spent more on transportation than any of the other three regions. The picture changed in 1996, however, with southern households spending the most—\$6,937, an increase of 15 percent over the previous year. In 1996, transportation's share in total household expenditures in the South was 21 percent, 3 percent higher than in the West and Midwest and 5 percent higher than in the Northeast. This increase in the South was fueled by new vehicle purchases. For example, the South was the only region in which households, on average, spent more than one-half of their transportation expenditures on purchasing vehicles. The share of vehicle purchases in household

Table 3-4

U.S. Gross Domestic Product by For-Hire Transportation Industries

(\$ billions)

	Current dollars			Chained 1992 dollars		
	1990	1992	1997	1990	1992	1997
Gross Domestic Product	5,743.8	6,244.4	8,110.9	6,136.3	6,244.4	7,269.8
Trucking and warehousing	75.8	82.2	97.9	73.7	82.2	87.3
Transportation by air	39.4	43.0	74.4	39.5	43.0	63.5
Railroad transportation	19.6	22.1	24.1	18.7	22.1	28.2
Incidental services	17.8	19.6	26.8	19.2	19.6	25.1
Transit	9.0	10.9	13.8	10.3	10.9	11.3
Water transportation	9.5	10.3	12.8	10.7	10.3	11.0
Pipelines, except natural gas	5.0	4.9	5.6	4.8	4.9	6.8
Total	176.4	192.8	255.5	176.7	192.8	241.5

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, November 1998, GDP by Industry table.

Table 3-5

**Household Transportation Expenditures:
1994–96**

Type of expenditure	1994	1995	1996
Average annual household transportation expenditures (\$ current)	\$6,044	\$6,016	\$6,382
Percentage of components			
Vehicle purchases			
Cars and trucks, new	23.0	19.8	18.9
Cars and trucks, used	21.3	23.5	24.6
Other vehicles	0.7	0.6	0.6
Total	44.0	43.9	44.1
Gasoline and motor oil	16.3	16.7	16.9
Other vehicle expenses			
Vehicle finance charges	3.9	4.3	4.3
Maintenance and repairs	11.3	10.9	10.1
Vehicle insurance	11.4	11.8	10.9
Vehicle rental, lease, license, and other charges	5.7	6.5	6.9
Total	32.3	33.5	32.3
Purchased transportation service	6.3	5.9	6.7

SOURCES: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey," 1995, 1996, and 1997.

transportation expenditures in the South was 57 percent in 1996, compared with 47 percent for the national average and 37 percent for the Northeast.

► Urban and Rural Areas

Since 1992, rural households have spent more on transportation in absolute dollar amounts than urban households. In 1996, rural households spent, on average, \$6,767 on transportation, \$440 more than their urban counterparts. Transportation's share of total rural household expenditures reached a high of 23.5 percent, while its share in urban households stayed at 18 percent. This increase indicates that rural house-

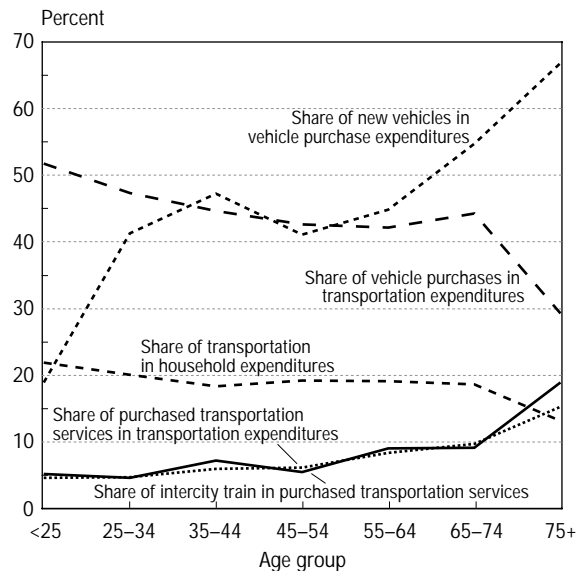
hold spending on transportation grew faster than total expenditures. In 1995, rural households, on average, spent \$3,300, or 55 percent of their transportation expenditures, on purchasing vehicles (including vehicle finance charges); in 1996, this expenditure reached \$3,773. Transportation's share of rural household expenditures, however, remained about the same in 1996. Moreover, rural households spent more on purchasing used vehicles than on new ones. Used vehicle purchases accounted for 64 percent of rural household expenditures, compared with 54 percent in urban households. Both rural and urban households sharply increased their spending on purchased transportation services—17 percent and 19 percent, respectively.

► Age Effect

Household transportation expenditures, in absolute dollar amounts, rise as the age of the head of the household increases, peaking at the 45 to 54 years of age bracket, and then declining. In 1996, households in which the head was between 45 and 54 years of age spent, on average, \$8,233, while households in the under 25 years of age bracket spent \$4,029. For households in which the head was 75 years of age or older, transportation expenditures were \$2,573. Transportation as a share of household expenditures was highest in young households. In 1996, households in the under 25 age bracket spent, on average, 22 percent of their total household expenditures on transportation. The percentage decreased gradually as age increased, reaching its lowest point—13 percent—in households in the 75 and over age bracket (see figure 3-1).

Young households also spent a higher proportion of their transportation expenditures on purchasing used vehicles than older households. For example, households in the youngest age group spent 81 percent of their transportation expendi-

Figure 3-1
Characteristics of Household Transportation Expenditures by Age Group



SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, "Consumer Expenditure Survey," 1996.

tures on purchasing used vehicles, while households in the oldest age group spent 67 percent on new vehicles.

The age of the head of the household also affected the amount of money spent on purchased transportation services, such as air, ship, mass transit, and taxi fares. In 1996, households in the youngest age bracket spent the least proportionally on purchased transportation services—4.6 percent of their transportation expenditures; the oldest age group spent the most—15 percent of their transportation expenditures. Moreover, households in the oldest age group spent more on intercity train services—19 percent of purchased transportation services, which was the highest percentage among all age groups.

Employment in Transportation Services

This section examines employment in for-hire transportation industries by sector and by occu-

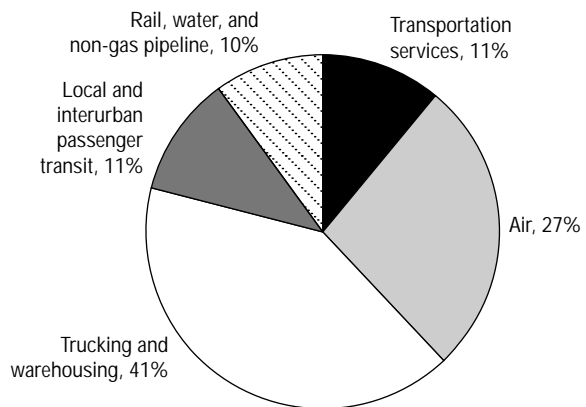
pation. It also discusses wages and salaries, and labor productivity. Employment in for-hire transportation industries includes all jobs, regardless of what an employee actually does (e.g., driving a truck or bookkeeping). Employment in transportation occupations includes jobs that are specific to transportation, regardless of employer (e.g., driving a truck for a trucking company or for a retail company).

► Employment in For-Hire Transportation Industries

Transportation industries employed about 4.2 million workers, which was 3.3 percent of the total U.S. civilian labor force in 1997. In the 1990s, changes in the share of transportation industry employment in the total U.S. labor force have been within a range of 0.2 percentage points (USDOT Forthcoming b).

The trucking and warehousing industry group has been the largest transportation employer throughout the 1980s and 1990s. As figure 3-2 shows, trucking and warehousing accounted for 41 percent of total transportation industry employment in 1997, much larger than

Figure 3-2
Modal Share of Transportation Industry Employment: 1997



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 1999* (Washington, DC: Forthcoming).

the combined total of railroad, water, transit, pipeline, and transportation services. In terms of annual growth, however, trucking and warehousing lagged behind some modes in different years. For example, transit employment grew by 4.7 percent in 1991, while trucking and warehousing employment grew by 2.8 percent (see USDOT Forthcoming b). In 1997, the two groups grew by 3.2 and 1.8 percent, respectively. Two trends are worth noting. First, railroad industry employment persistently declined in the 1990s, although the decline recently slowed down from that experienced in the early part of the decade. Second, in recent years, employment in the transportation services industry grew faster than all other modes except for transit.

In 1997, the transportation industry as a whole paid \$134 billion in wages and salaries, accounting for 3.4 percent of total wage and salary accruals in the entire economy. The transportation industry's share in the total declined from 5.3 percent in 1960 to 4.3 percent in 1980 and remained stable at 3.5 percent between 1990 and 1996 (USDOT Forthcoming b).

The slight decline of transportation wages and salaries relative to total wages and salaries can be explained by several factors. One influencing factor is the decline of transportation industry employment as a share of the total U.S. labor force. Another factor is the relative decrease in the average transportation wage rate (the level of wage or salary per full-time equivalent employee). In 1980, the annual wage rate in the transportation industry was 32 percent higher than the average wage for the entire U.S. labor force. That advantage declined to 20 percent in 1985 and to 10 percent in 1990. By 1997, the transportation wage rate was only about 3 percent higher than the national average (USDOT Forthcoming b).

Not surprisingly, the distribution of the transportation industry's total wages and salaries among modes follows a pattern similar to that in

the employment data, with the trucking and warehousing industry group's share accounting for a little over 38 percent of the total in 1997. The railroad industry's share decreased dramatically, from almost 38 percent in 1960 to less than 9 percent in 1997. In contrast, the air transportation industry's share went from under 9 percent in 1960 to over 30 percent in 1997 (USDOT Forthcoming b).

Wage rates for a particular industry indicate how well paid employees are in that industry. The average wage rate for the transportation industry as a whole has declined relative to the average wage rate for the entire U.S. labor force.

The local and interurban passenger transit industry falls below all other modes in wage rates. The next lowest was the trucking and warehousing industry. At \$31,700 in 1997, trucking and warehousing industry wages were more than 8 percent lower than the average for the transportation industry as a whole and 5 percent lower than the national average. The pipeline industry, which has the lowest wage and salary total, pays the highest wage rate. In 1997, the pipeline industry's wage rate, at \$60,000, was almost triple the transit wage rate and nearly double the trucking and warehousing industry wage rate (USDOT Forthcoming b).

► Employment in Transportation Occupations

Employment in transportation occupations covers every industry but includes only people with skills specific to transportation, such as truck drivers and airline pilots. As the only employment measure that includes transportation-specific employment within nontransportation industries, transportation occupation data are useful in estimating transportation operations outside as well as within for-hire transportation industries (USDOT Forthcoming b).

In 1997, employment in transportation occupations was 4.5 million workers, or 3.5 percent

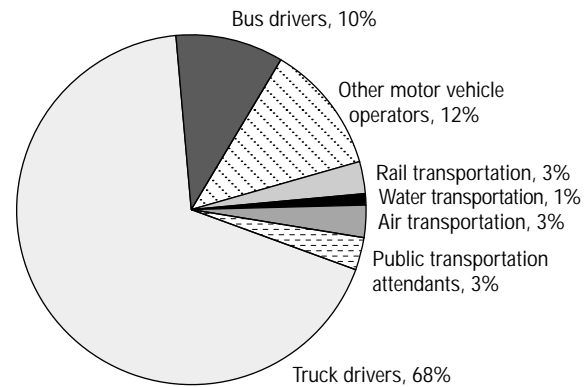
of all employed workers 16 years of age and over. Although employment in transportation occupations increased by 85,000 workers in 1997, transportation's share in the total employment decreased slightly because total employment increased faster than transportation employment. From 1990 to 1997, however, differences between the growth rates of transportation industry employment and transportation occupational employment have been small.

As mentioned earlier, information on the distribution of transportation occupational employment provides an indicator of the magnitude of transportation operations inside and outside transportation industries. The National Industry-Occupation Employment Matrix from the Bureau of Labor Statistics provides data on the industrial distribution of occupational employment. The latest matrix is for 1996 and shows that within the transportation industry group 1.5 million workers (36 percent of the total) were employed in transportation occupations (USDOL BLS 1996b). Most were truck drivers, 62 percent, and bus drivers, 12 percent.

Nontransportation industries employed nearly two-thirds of the workers in transportation occupations in 1996. The wholesale and retail trade industry employed almost half of these workers, with truck driving as the predominant occupation. The service industry is the third largest employer of transportation occupational workers—mostly bus drivers. The government employed more people in transportation occupations than the agriculture, mining, communications and utilities, and finance, insurance, and real estate industries combined.

Figure 3-3 shows the distribution of total transportation occupational employment in 1997. Truck drivers, including drivers of heavy and light trucks, accounted for the largest percentage (67.8 percent) of those employed in transportation occupations. This percentage,

Figure 3-3
Employment in Transportation Occupations: 1997



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 1999* (Washington, DC: Forthcoming).

which was the same as in the previous year, was 2.7 percent higher than in 1990 (USDOT Forthcoming b). Throughout the 1980s and early 1990s, truck drivers accounted for about 65 percent of all employed transportation occupational workers, although the higher shares in more recent years may point to a new pattern. Employment in air transportation occupations grew the fastest in 1997, posting a 12.4 percent gain. In contrast, in 1997, employment in trucking occupations grew 1.9 percent, while bus drivers and water transportation occupations declined by 8 and 26 percent, respectively.

Information on occupational wages and salaries for transportation is not as extensive as that on industry wages and salaries. Based on available data, airplane pilots and navigators are paid the highest wage, while bus drivers and taxi drivers are paid the lowest.

Although earnings differentials among major transportation occupations have remained stable since the mid-1980s, earnings for different transportation occupations often fluctuated (USDOT Forthcoming b).

Labor Productivity in Transportation

Transportation labor productivity measures the ratio of transportation output and transportation labor input. Transportation output is usually measured by quality-adjusted ton-miles and passenger-miles, and transportation input is usually measured by the number of transportation employees or employee-hours. Because of data limitations, this section discusses productivity measures based on the number of employees only. Regardless of how output and input are measured, labor productivity measures only show how productive labor is, not why labor is productive. Also, because labor productivity measures are most often conducted on an industry-by-industry basis, they do not provide information about the productivity of workers in transportation occupations (USDOL BLS OPT 1999).

From 1990 to 1996, the output of the railroad industry (measured by an index of passenger-miles, freight ton-miles, revenue, and other factors) went up by 21.2 percent, while its input went down by 16.1 percent. As a result, railroad labor productivity went up by 44.5 percent. Productivity increased even more in the 1980s, posting a 106 percent increase. On average, railroad labor productivity improved by 4.5 percent annually from 1947 to 1996 (USDOL BLS OPT 1999).

In contrast, labor productivity in the trucking industry increased much more slowly. From 1990 to 1996, output per employee went up by 17.7 percent. As in the railroad industry, labor productivity in the trucking industry increased much faster from 1981 to 1990—32.9 percent—but still much slower than the railroad industry during the same period. From 1954 to 1996, labor productivity in the trucking industry rose by 2.8 percent each year, considerably less than that recorded by the railroad industry (USDOL BLS OPT 1999).

The air transportation industry (both passenger and freight) enjoyed the fastest labor productivity growth over the 1947 to 1996 period—5.6 percent annually. Its growth rate between 1990 and 1996 was 19.5 percent, faster than the trucking industry but much slower than the railroad industry (USDOL BLS OPT 1999).

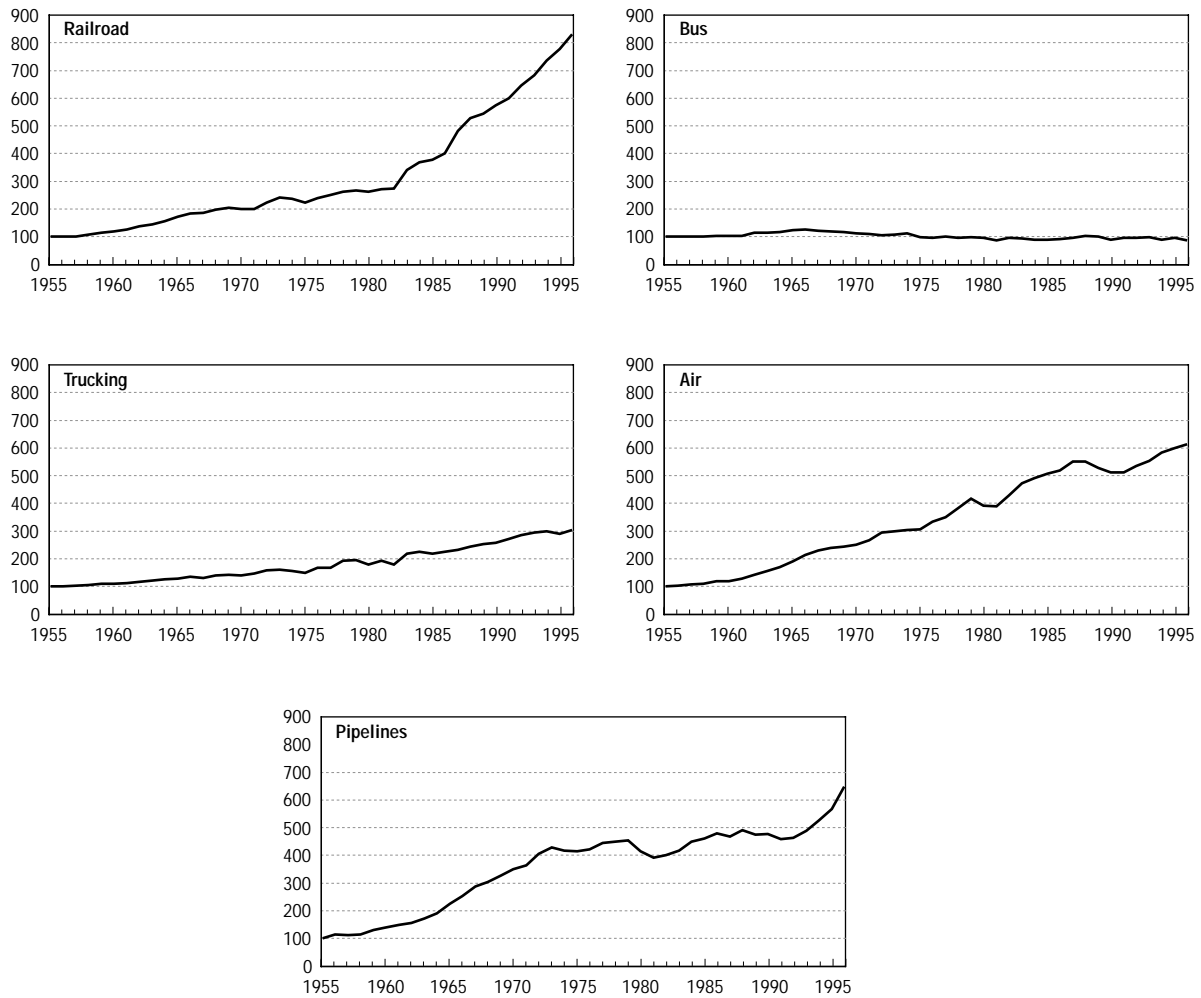
From 1947 to 1996, the average annual growth in labor productivity in the petroleum pipelines industry was similar to that in the air transportation industry. In the 1990s, however, productivity growth in the petroleum pipelines industry exceeded that in the air transportation industry (36.1 percent vs. 19.5 percent) (USDOL BLS OPT 1999).

Of all the modes, Class I bus carriers had the lowest productivity, with considerable industry fluctuation in the 1980s and 1990s. From 1954 to 1996, labor productivity decreased 0.3 percent each year on average, the combined result of decreasing labor input and a more rapidly decreasing output (USDOL BLS OPT 1999).

Figure 3-4 displays trends in labor productivity between 1955 and 1996 for the five transportation industries discussed above. Many factors contribute to the level of labor productivity and its changes over time. One factor is the availability of transportation capital and the level of technologies embodied in the capital. Transportation capital includes both transportation equipment, such as locomotives, and transportation-related structures, such as airports. Other factors include transportation-related human capital, infrastructure, and government regulations. It is not clear how these factors interact to influence labor productivity growth or how important each factor is. In some cases, changes in labor productivity may have been driven by factors that have nothing to do with labor. For example, improvements in a road or business logistics may make truck driving more productive.

Figure 3-4
Labor Productivity Trends by Mode

Index: 1955 = 100



NOTES: Output is measured by quality-adjusted ton-miles and passenger-miles for railroad and air transportation, quality-adjusted ton-miles for trucking and pipelines, and passenger-miles for buses. No data are available for water transportation.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Office of Productivity and Technology, 1999.

PUBLIC TRANSPORTATION REVENUES AND EXPENDITURES

All levels of government play important roles in transportation by contributing to transportation-related final demand and labor productivity growth. This section provides summary information on government revenues and expenditures on transportation, including capital investment.²

Government Revenues from Transportation

In fiscal year (FY) 1995, government revenues from all transportation modes reached \$93.7 billion (current dollars). Adjusted for price increases, government transportation revenues increased from \$83.5 billion in 1994 to \$86.7 billion in 1995 (USDOT Forthcoming a, tables A-1, A-2). Figure 3-5 shows that the annual growth rate in government transportation revenues fluctuated considerably between 1986 and 1995. The parallel trend in constant and current dollar growth rates indicates that the inflationary impact on government transportation revenues stayed fairly constant over this period, although it seems to have declined slightly in the first half of the 1990s.

Almost half of the government transportation revenues are raised by states. In 1995, state government revenues accounted for 48 percent of the total, while federal and local revenues were 32 and 20 percent, respectively (USDOT Forthcoming a). Since the mid-1980s, the share of total transportation revenues among the three levels of government has remained stable. For example, in

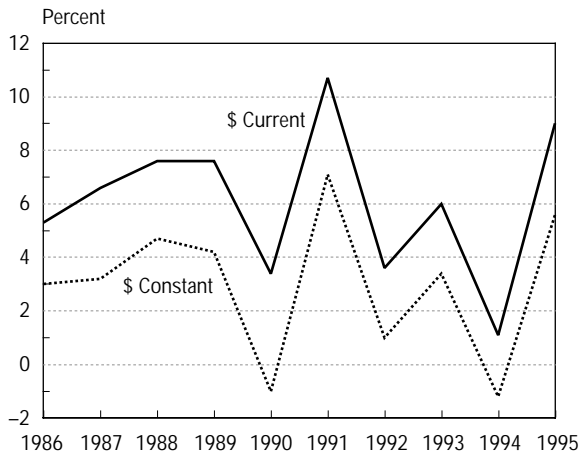
1985 the federal government's share was 34 percent, while state and local governments' shares were 48 percent and 18 percent, respectively.

Highways generated \$66.74 billion (71 percent) in government transportation revenues in 1995 (see figure 3-6). Pipeline transportation revenues were the lowest of all modes, accounting for just \$35 million out of \$93.7 billion in 1996. The proportions of revenues collected by various levels of government from different modes fluctuates from year to year. In 1996, for example, state governments received a large share of revenues from highway transportation, while local governments received the most from air transportation and transit, and the federal government received the largest share from pipelines and water transportation. At other times, the pattern has differed. For example, local governments collected half the water revenues from 1985 to 1989, and until 1993 the federal government's share of revenues from air transportation was larger than those of state and local governments.

Fuel taxes are important sources of revenue for federal and state governments. The bulk of fuel taxes comes from the highway mode. At the federal level, gasoline and diesel fuel taxes provided more than 85.8 percent of total highway trust fund revenues in fiscal year (FY) 1995. At the state level, motor fuel taxes accounted for almost 60 percent of total state highway revenues. Motor fuel tax receipts are a far less important portion of revenues for local governments than for federal and state governments. Property tax revenues are a far greater income source for local governments than motor fuel taxes. Fuel taxes are less important as a source of government revenues from other modes of transportation. Fuel taxes accounted for only 3.4 percent of total Federal Airport and Airway Trust Fund revenues in FY 1995. In the same year, the inland waterway fuel tax accounted for 6.1 percent of the total federal receipts from water transportation

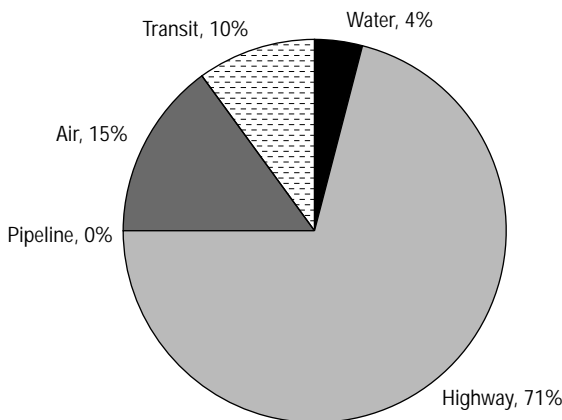
²Statistics in this section are based on data from the U.S. Department of Commerce, Census Bureau, which uses different definitions and accounting methods from those used by some modal administrations of the U.S. Department of Transportation. For example, revenues in this section are limited to gasoline taxes, tolls, and other sources that are collected directly from transportation users. Revenue statistics published by the Federal Highway Administration also include items such as investment income and other taxes and fees.

Figure 3-5
Growth in Government Transportation Revenues: 1986–95



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Government Transportation Financial Statistics: Fiscal Years 1985–95, forthcoming on the BTS website at www.bts.gov.

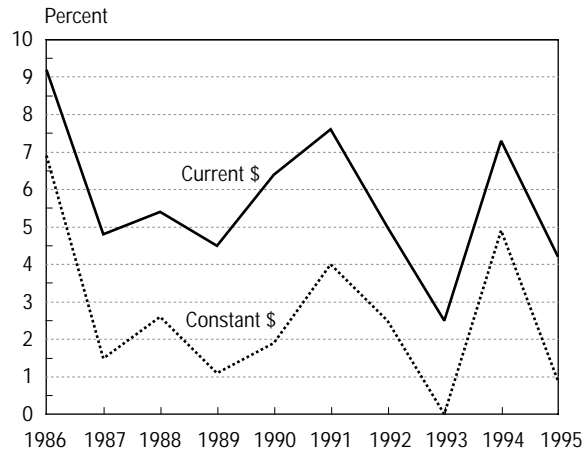
Figure 3-6
Government Transportation Revenues by Mode: Fiscal Year 1995



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Government Transportation Financial Statistics: Fiscal Years 1985–95, forthcoming on the BTS website at www.bts.gov.

(USDOT Forthcoming a). Similar information is not available for state and local government revenues from these and other modes.

Figure 3-7
Growth in Government Transportation Expenditures: 1986–95



SOURCE: U.S. Department of Transportation, Bureau of Transportation Statistics, Government Transportation Financial Statistics: Fiscal Years 1985–95, forthcoming on the BTS website at www.bts.gov.

Government Expenditures on Transportation

In FY 1995, all levels of government spent \$129.3 billion (current dollars) on all modes of transportation. (Federal grants are included but not double counted.) Figure 3-7 shows that growth in government transportation expenditures in current and constant dollars followed a similar trend, but it is important to note that price changes had a greater impact on current dollar expenditures in the late 1980s and early 1990s.

Excluding federal grants, state and local governments spent \$89.36 billion (current dollars) or about 69.1 percent of total government transportation expenditures in 1995. This is about the same as their shares in total transportation revenues. Since the mid-1980s, the distribution of total transportation expenditures among the three levels of governments is almost identical to the distribution of total transportation revenues. From 1985 to 1995, the federal and the state and local governments' shares in total government transportation revenues and expenditures averaged 32 and 68 percent, respectively.

As discussed here, the near equality of the shares of revenues and expenditures is due to expenditures reflecting each level of government using their own funds before federal grants are transferred. Since most federal government expenditures on transportation are in the form of grants to states and localities, expenditures after federal grants present a very different picture. In FY 1995, 63 percent of the \$39.93 billion in federal government expenditures on transportation were grants to state and local governments. The balance was spent directly by the federal government. Including federal grants, state and local governments accounted for about 86 percent of the \$129.3 billion of total government transportation expenditures. Between state and local governments, local governments spend more than state governments overall. In 1995, the local government share of the state and local total direct expenditures was 54 percent (USDOT Forthcoming a).

Governments spent more on highways than on all other modes combined. In 1995, total highway spending was \$79.2 billion, about 61 percent of total government transportation expenditures. Nearly three-quarters of this amount was spent by state and local governments. Transit expenditures accounted for nearly 20 percent of the total; pipelines received only \$42 million, less than one-third of one-tenth of a percent (USDOT BTS Forthcoming a). A comparison among modes indicates that the federal government spends more on air, water, and rail; state and local governments, using their own funds, spend more on highways, transit, and pipelines. In 1995, federal government spending (directly and through grants) on air and water amounted to about 61 percent of total government expenditures on these modes and almost all of government expenditures on rail (USDOT Forthcoming a). In contrast, state and local government expenditures on transit and pipelines amounted to 82.6 percent and 57.1 per-

cent, respectively, of total government spending on these modes.

CAPITAL INVESTMENT AND CAPITAL STOCK

An important category of government transportation expenditures is capital investment, which includes infrastructure and equipment. Transportation infrastructure is a comprehensive term used to describe a variety of fixed structures and facilities used by all modes of transportation.

Generally, transportation infrastructure in its physical form includes railroads, highways and streets, bridges and tunnels, airports and airways, ports and waterways, mass transit facilities, and pipelines. Except for railroads and pipelines, transportation infrastructure in the United States relies largely on public investments and some joint investments between the public and private sectors.

In 1995, all levels of government invested \$60.6 billion, accounting for 46.9 percent of total government transportation expenditures. Not surprisingly, highways received the lion's share, with 71 percent of the total, while air transportation and transit received 12.9 and 12.4 percent of the total, respectively (USDOT Forthcoming a).

In terms of the investment proportion of total government expenditures, the ranking among different modes is slightly different. For example, for each dollar spent on railroad transportation, more than 55 cents was invested in capital stock; for each dollar spent on highways, 54 cents went to capital investments. For all other modes, except air, the government invested 26 cents of every dollar spent on these modes in capital stock. Air transportation had the lowest government investment ratio of 23.7 percent (USDOT Forthcoming a).

Table 3-6

Net Capital Stock of Highways and Streets

(Current \$ billions)

	1986	1988	1990	1992	1994	1996
Federal	18.7	19.8	20.7	20.7	22.2	23.8
State and local	798.6	866.7	950.4	997.6	1,111.4	1262.5
Total	817.3	886.5	971.1	1,018.3	1,133.6	1,286.3

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, September 1997.

Over a period of decades, government investments in transportation infrastructure have resulted in a huge transportation infrastructure capital stock that constitutes a significant and integral component of the total national wealth and productive capacity. Based on estimates from the national economic accounts, public capital stock in highways and streets was worth \$1.3 trillion in 1996. State and local governments own nearly all (98.1 percent) of this capital stock (see table 3-6).

Governments invest in other types of transportation infrastructures as well, but detailed data are not available on these investments. To better manage transportation infrastructure, calculate its contribution to the U.S. economy, and plan its future expansion, estimates are needed on the size and scope of the total capital stock and also for specific types of assets. These and other data needs are discussed in chapter 6.

DATA NEEDS

Since the mid-1980s, many attempts have been made to understand how public investments in transportation infrastructure contribute to private production and changes in productivity and economic growth. Inadequate capital stock data often hinder these analyses.

Although total transportation infrastructure cost can be calculated from past investments, cap-

ital stock data are required to determine how much of the cost is embodied in commodities and services provided by various sectors of the economy because of their use of the infrastructure.

Another important use of transportation infrastructure capital stock data is to assist in determining investment needs. From the perspective of maintaining capital stock value and long-term national wealth, information on the level and condition of capital stock can be used to estimate how much capital stock has depreciated. To keep capital stock intact, investments are needed to compensate for depreciation. From the perspective of maintaining or expanding capital stock to meet the need for capital services, information on the existing stock's capacity to provide such services is required to estimate investment needs.

The current official statistics, however, do not completely satisfy these information requirements because they either do not provide the necessary details or are developed within frameworks that are appropriate to some, but not all, data needs. Since market transactions do not exist for most uses of public transportation infrastructure, data on infrastructure cost at the user level cannot be directly collected. To fill this data gap, the Bureau of Transportation Statistics is currently implementing a statistical program to estimate transportation infrastructure capital stock of all transportation modes at national and individual state levels.

REFERENCES

U.S. Department of Commerce (USDOC), Bureau of Economic Analysis (BEA). 1997. *Survey of Current Business*. September.

_____. 1998. *Survey of Current Business*.

U.S. Department of Labor (USDOL), Bureau of Labor Statistics (BLS). 1996a. Consumer Expenditure Survey.

_____. 1996b. *National Industry Occupation: Employment Matrix*. Available at www.stats.bls.gov/asp/oep/nioem/empiohm.asp.

U.S. Department of Labor (USDOL), Bureau of Labor Statistics (BLS), Office of Productivity and Technology (OPT). 1999. Personal communication.

U.S. Department of Transportation (USDOT), Bureau of Transportation Statistics. Forthcoming a. Government Transportation Financial Statistics: Fiscal Years 1985–95. Available on the BTS website: www.bts.gov.

_____. Forthcoming b. *National Transportation Statistics 1999*. Washington, DC.